Information Sheet on
DRYING RATE NOMOGRAPHS VII. WHITE POTATO HALF CUBES

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A method of estimating drying times from drying-rate nomographs has been published in the form of an information sheet (AIC-31-I), and drying-rate nomographs are available for riced white potatoes (AIC-31-I), blanched sweet corn (AIC-31-II), white potato strips under through-flow conditions (AIC-31-III), shredded cabbage (AIC-31-IV), onion slices (AIC-31-V), and sweetpotato strips (AIC-31-VI).

The drying-rate characteristics of half cubes (3/16x3/8x3/8-inch) of white potato (Deschutes Netted Gem variety) are presented nomographically in this information sheet. The potatoes were peeled by abrasion, trimmed by hand, washed, cut into half cubes in a mechanical cutter, and thoroughly washed with a spray of cold water. The half cubes were blanched for 4 minutes in steam at atmospheric pressure and at a loading density of 4 lbs./sq.ft. and were reloaded on the drying tray. Between all operations before blanching, the material was kept submerged in cold water.

The first set of nomographs (Figs. 1 to 4) deals with the drying rates of potato half cubes on metal grid trays, and the second set (Figs. 5 to 8) with potato half cubes on wooden slat trays, both under cross air flow conditions. Specifically, the following nomographs are included in this information sheet:

Metal Grid Trays	Wooden Slat Trays	Subject
Figure 1	Figure 5	Drying from $T_o = 3.4$ to $T = 0.20$ at reference conditions of L_o and V.
" 2	" 6	Effect of L_o and V on Figures 1 and 5.
" 3	" 7	Drying from $T = 0.20$ to T_f.
" 4	" 8	θ corrections for $T_o > 3.4$.

The effects of air velocity and tray loading density upon the drying times from $T_o = 3.4$ to $T = 0.20$ are related by the equation

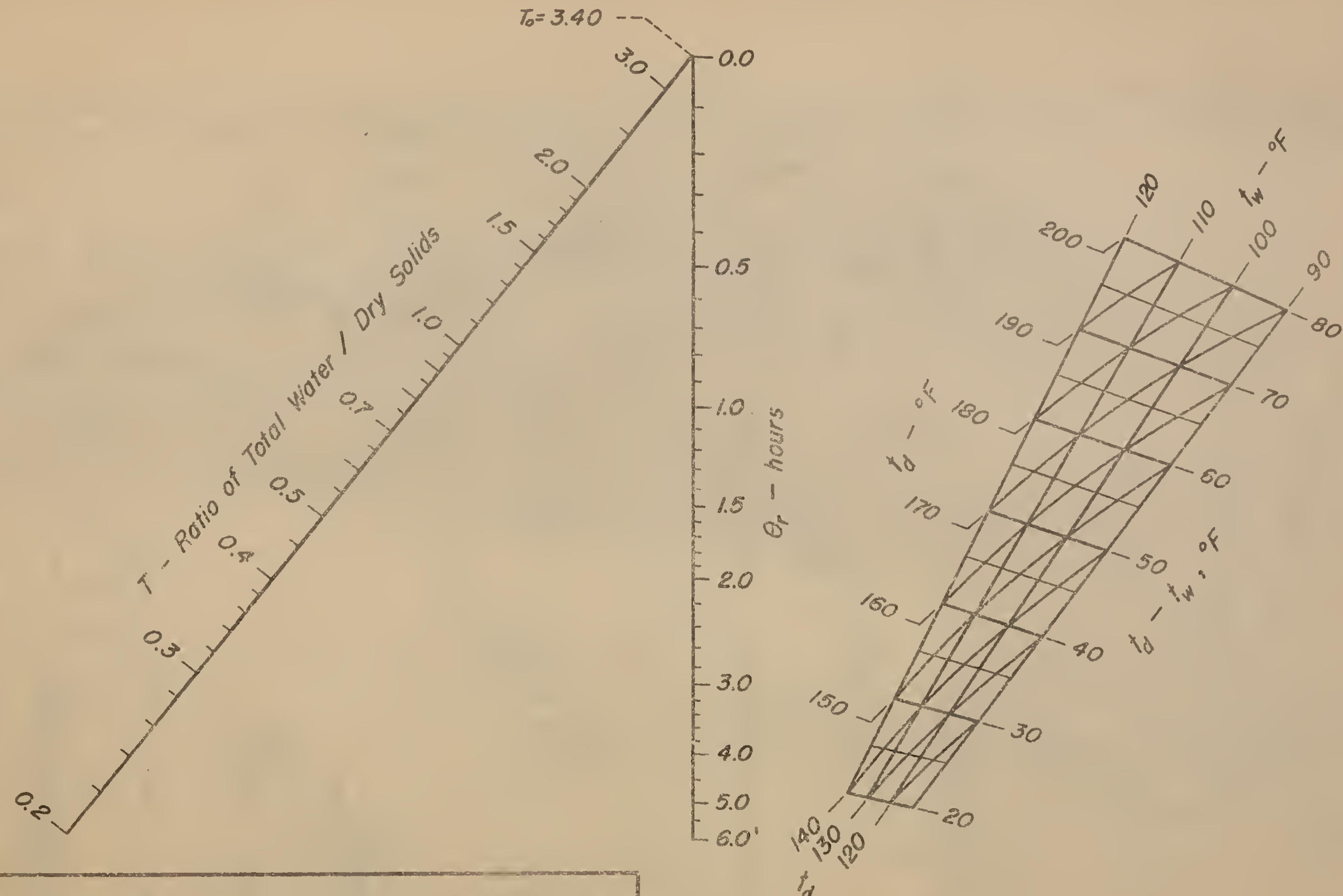
$$\theta \text{ (at } V, L_o) = \theta_r \cdot f(V, L_o)$$

In this equation, θ_r is the drying time from T_o to T under reference conditions (V = 800 ft./min. and L_o = 1.5 lbs./sq.ft.) as obtained from Figure 1 or 5, and values of $f(V, L_o)$ are obtained from Figure 2 or 6. The function $f(V, L_o)$ must correspond to the values of V and L_o under consideration and must be selected at the value of T to which θ and θ_r apply. (The nomenclature used is that listed in Information Sheet AIC-31-I.) Below T = 0.20, drying times are essentially independent of air velocity and tray loading density within the ranges investigated, i.e., V = 400 to 1200 ft./min. and L_o = 0.75 to 3.0 lbs./sq.ft.

Although the drying rate nomographs presented in this information sheet were prepared for white potatoes of the Deschutes Netted Gem variety, they may be used in approximating drying times for potatoes of the Klamath Russet variety. Differences found between the two varieties were not greater than those encountered between lots of the same variety grown under different conditions, or stored under different conditions, or of different maturities.

Figures 3 and 7, representing drying from $T = 0.20$ to T_f, should not be used in estimating drying times more accurately than ± 0.5 hour. Drying times of potato pieces in the low moisture range are influenced by the previous drying history of the material. Under identical final drying conditions, potato pieces which are dried rapidly in the high moisture range tend to continue to dry rapidly in the low moisture range, and pieces which are dried slowly in the high moisture range tend to continue to dry slowly in the low moisture range. This is the reverse of what is usually meant by the term "case hardening". Under extreme conditions, "case hardening" in the commonly accepted sense may occur and tend to retard the drying in the final stages. These effects are not generally of large magnitude, but serve to make drying time estimates inaccurate in the low moisture range.

Good dehydrating practice indicates the use of finishing bin driers for the final drying stage. Pending exact determination of drying times under the condition of through-flow of air, such as prevails in bin drying, Figure 3 may be adapted to making rough estimates of the time required for finishing.



THE DRYING OF 3/16" x 3/8" x 3/8" PIECES OF DESCHUTES NETTED GEM POTATOES

FROM $T_o = 3.4$ TO $T = 0.2$

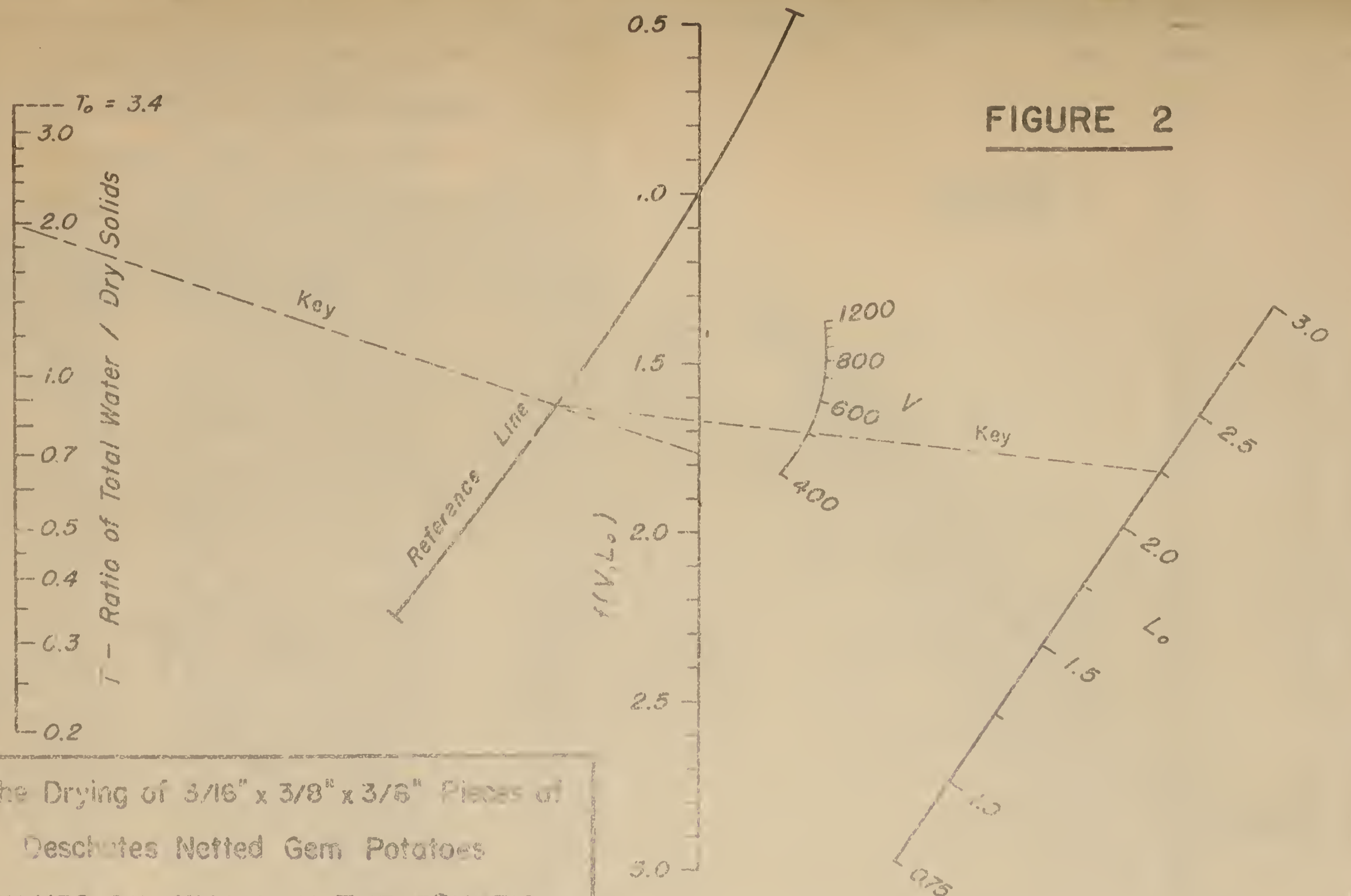
$L_o = 1.5$ lbs./sq.ft. on Metal Grid Trays

$V = 800$ ft./min. , Cross Air Flow

FIGURE 1

M.E.L. 9-13-44

FIGURE 2



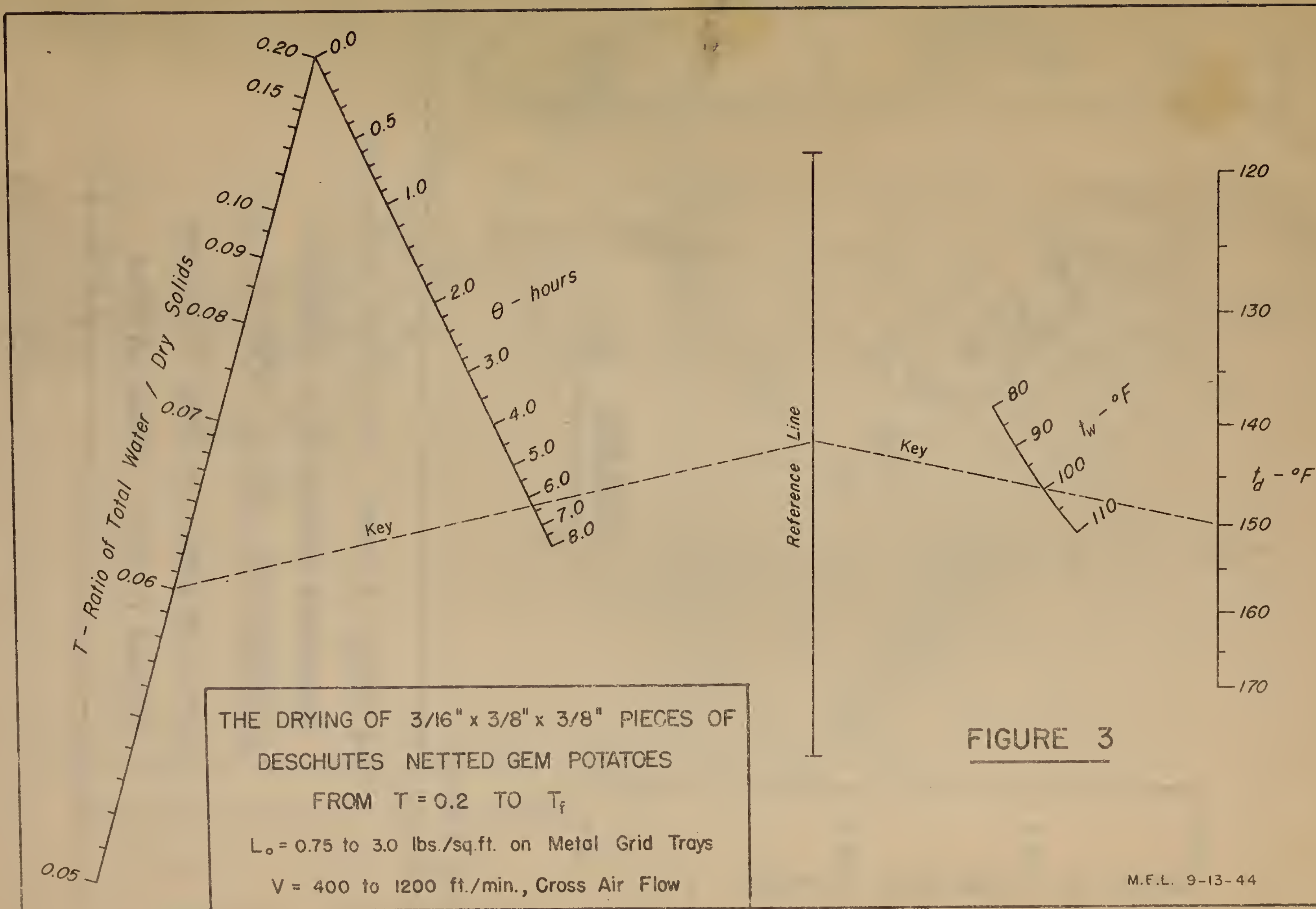
The Drying of 3/16" x 3/8" x 3/8" Pieces of Deschutes Netted Gem Potatoes

VALUES OF $f(V,L_o)$ IN THE EQUATION

$\Theta = \Theta_r \cdot f(V,L_o)$

Metal Grid Trays Cross Air Flow

M.E.L. 9-13-44



THE DRYING OF 3/16" x 3/8" x 3/8" PIECES OF DESCHUTES NETTED GEM POTATOES FROM T = 0.2 TO T_f

L_o = 0.75 to 3.0 lbs./sq.ft. on Metal Grid Trays

V = 400 to 1200 ft./min., Cross Air Flow

FIGURE 3

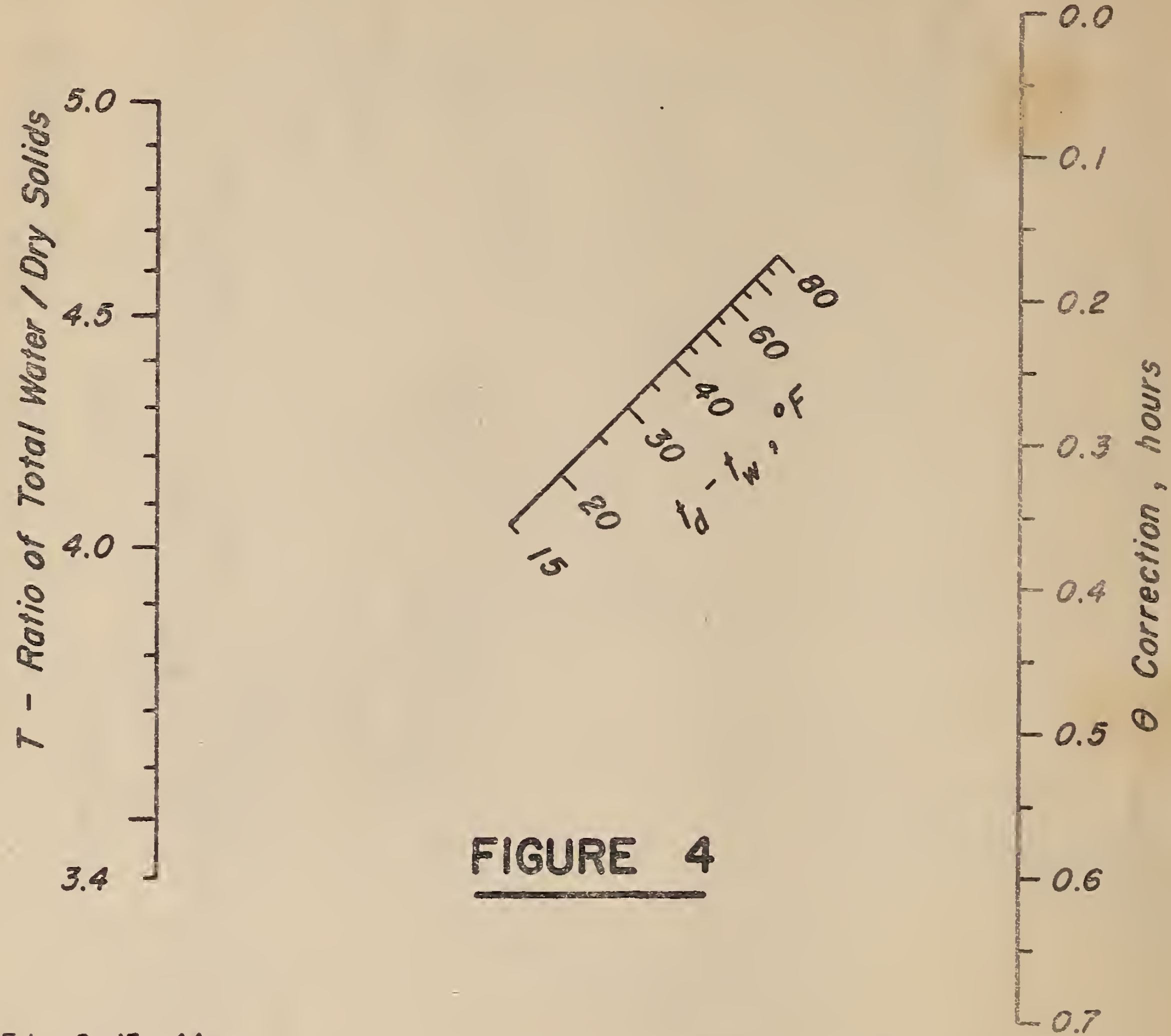


FIGURE 4

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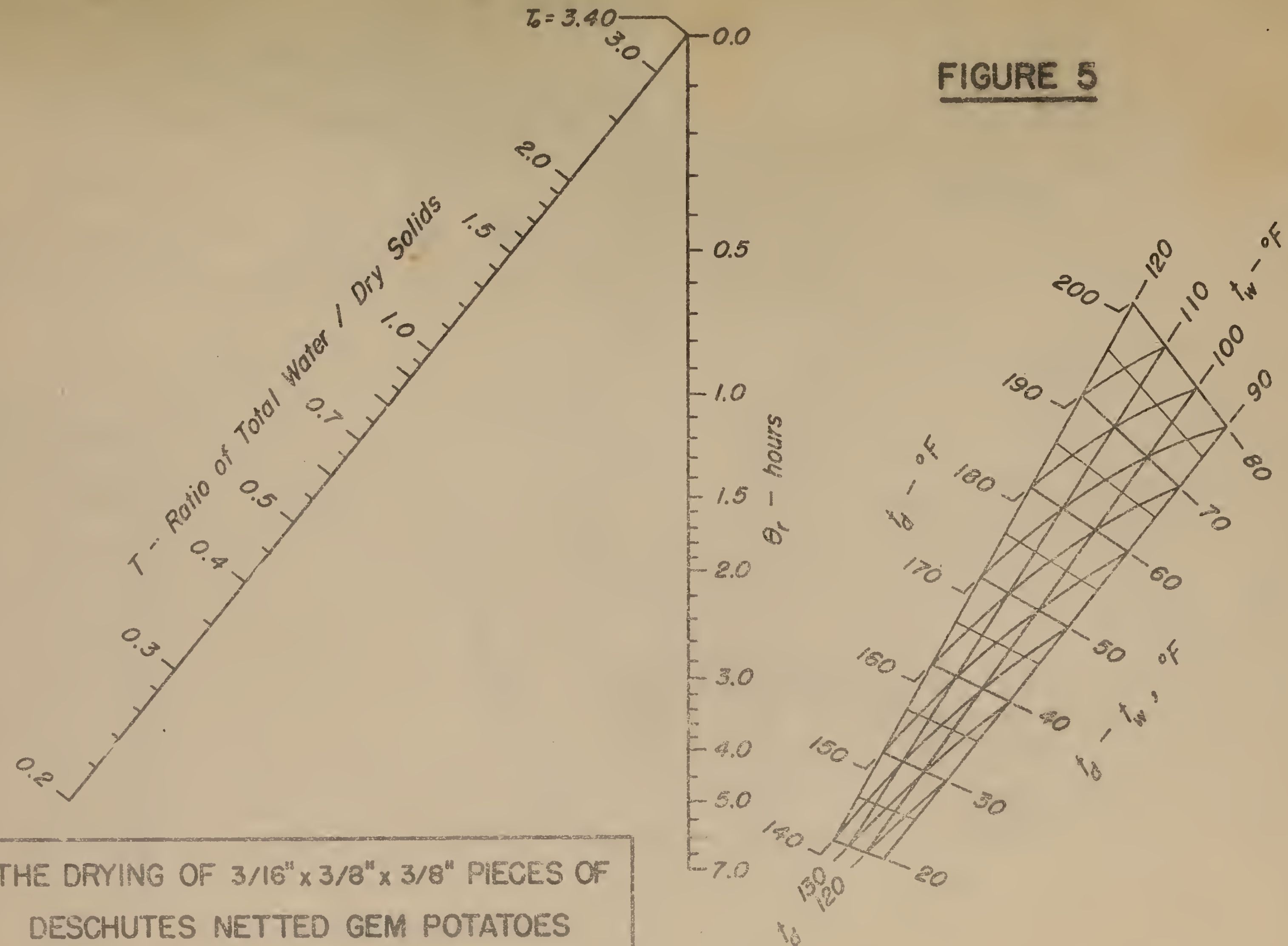
The Drying of 3/16" x 3/8" x 3/8" Pieces of Deschutes Netted Gem Potatoes

CORRECTION OF θ_r FOR $T_o > 3.4$

L_o = 1.5 lbs./sq.ft. on Metal Grid Trays

V = 800 ft./min., Cross Air Flow

FIGURE 5



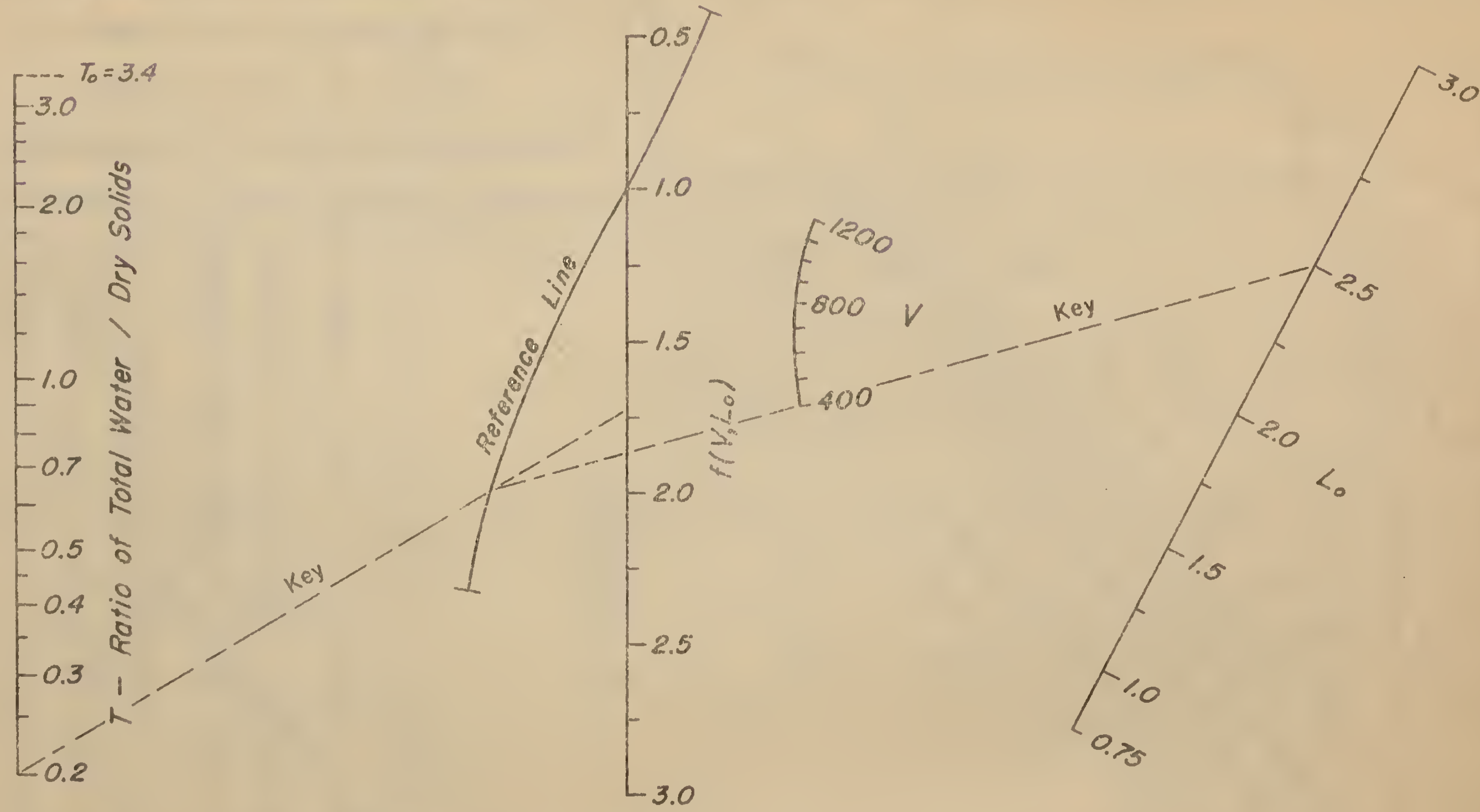
THE DRYING OF 3/16" x 3/8" x 3/8" PIECES OF DESCHUTES NETTED GEM POTATOES

FROM $T_o = 3.4$ TO $T = 0.2$

L_o = 1.5 lbs./sq.ft. on Wooden Slat Trays

V = 800 ft./min., Cross Air Flow

M.E.L. 9-13-44



The Drying of 3/16" x 3/8" x 3/8" Pieces of Deschutes Netted Gem Potatoes

VALUES OF $f(V, L_o)$ IN THE EQUATION

$$\Theta = \Theta_r \cdot f(V, L_o)$$

Wooden Slat Trays **Cross Air Flow**

FIGURE 6

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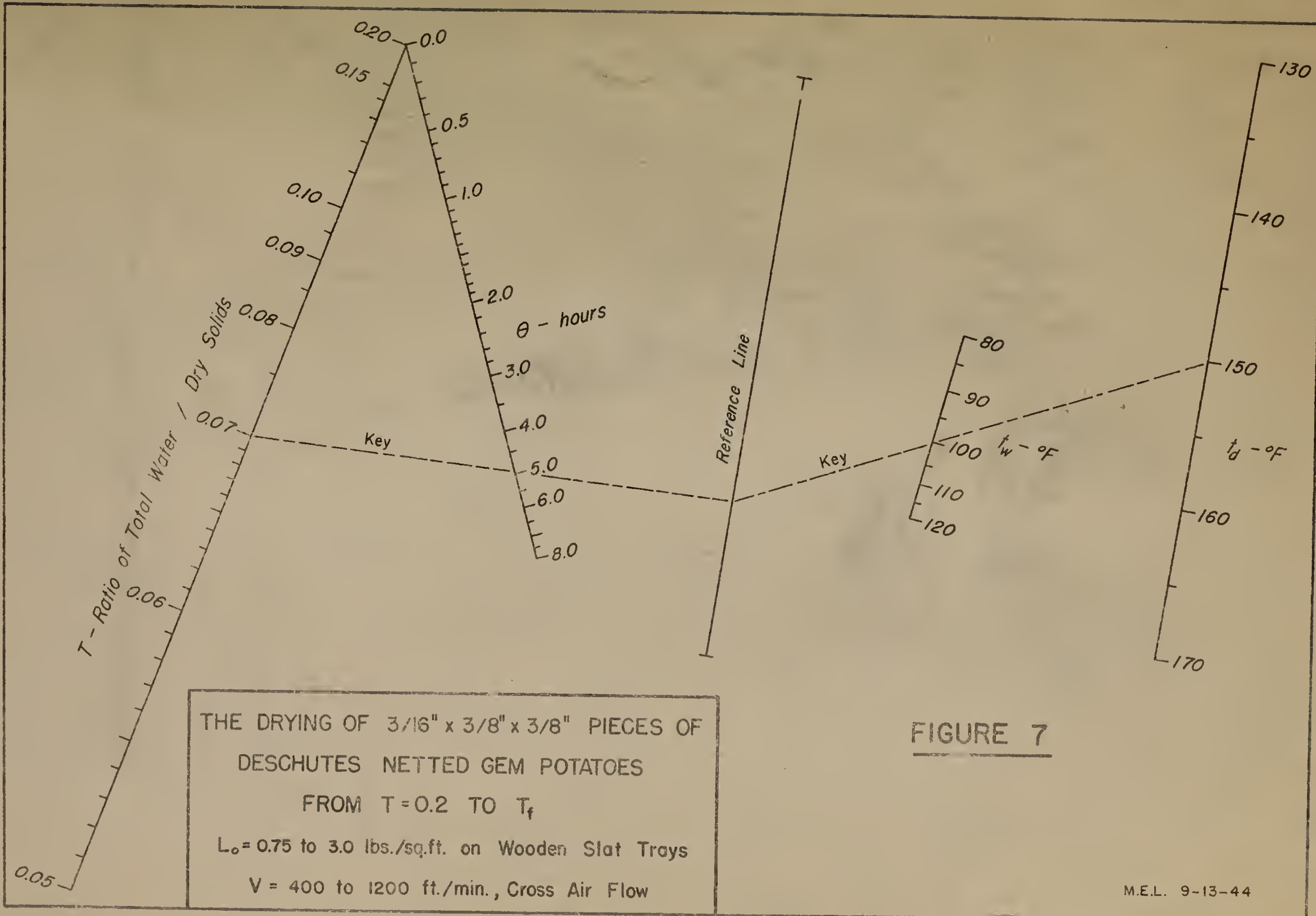

THE DRYING OF 3/16" x 3/8" x 3/8" PIECES OF DESCHUTES NETTED GEM POTATOES FROM T = 0.2 TO T_f

L_o = 0.75 to 3.0 lbs./sq.ft. on Wooden Slat Trays

V = 400 to 1200 ft./min., Cross Air Flow

FIGURE 7

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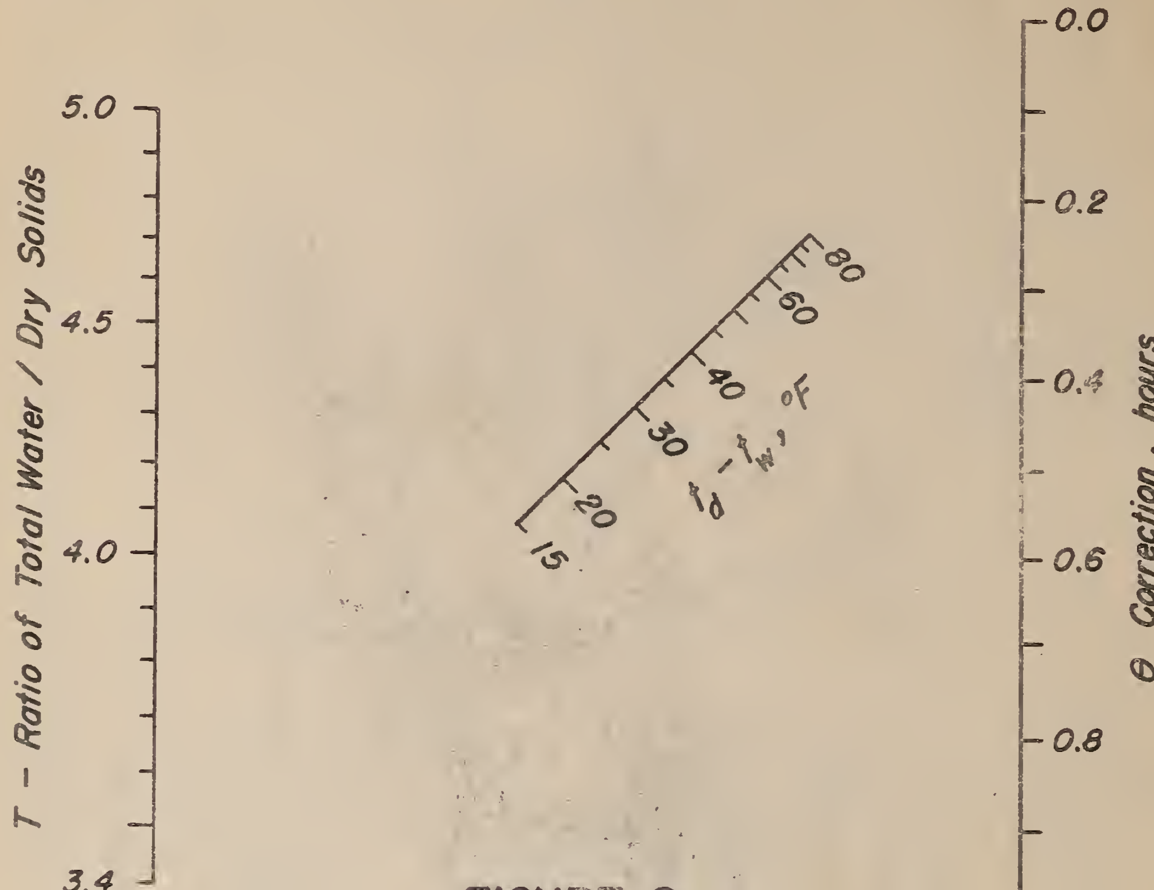

FIGURE 8

M.E.L. 9-13-44

The Drying of 3/16" x 3/8" x 3/8" Pieces of

Deschutes Netted Gem Potatoes

CORRECTION OF θ_r FOR $T_o > 3.4$

L_o = 1.5 lbs./sq.ft. on Wooden Slat Trays

V = 800 ft./min., Cross Air Flow